

Claims

- [c1] 1. A wide viewing angle liquid crystal display, comprising:
- a first substrate having a plurality of thin film transistors, a plurality of scanning lines and a plurality of data lines;
 - a color filter layer over the first substrate covering the thin film transistors, the scanning lines and the data lines;
 - a plurality of pixel electrodes over parts of the color filter layer;
 - a plurality of common electrodes over parts of the color filter layer, wherein the common electrodes and the pixel electrodes are alternately positioned;
 - a first alignment film over the color filter layer covering the pixel electrodes and the common electrodes;
 - a second substrate formed above the first substrate;
 - a second alignment film formed over the second substrate, wherein the second alignment film faces the first alignment film; and
 - a liquid crystal layer formed between the first alignment film and the second alignment film.
- [c2] 2. The liquid crystal display of claim 1, wherein the dis-

play further includes a planarization layer over the color filter layer.

[c3] 3. The liquid crystal display of claim 1, wherein the color filter layer includes a plurality of red-filter blocks, a plurality of green-filter blocks and a plurality of blue-filter blocks grouped together in a regular repetitive pattern.

[c4] 4. The liquid crystal display of claim 3, wherein a black matrix layer is formed in the space between the red-filter blocks, the green-filter blocks and the blue-filter blocks.

[c5] 5. The liquid crystal display of claim 1, wherein each thin film transistor includes:

a gate electrode above the first substrate, wherein the gate electrode is connected to a corresponding scanning line;

a gate insulating layer above the first substrate covering the gate electrode;

a channel layer over the gate insulating layer above the gate electrode; and

a source/drain region over the channel layer, wherein the source region is connected to a corresponding data line.

[c6] 6. The liquid crystal display of claim 5, wherein the dis-

play further includes a conductive structure in the color filter layer for electrically connecting the drain region with a corresponding pixel electrode.

- [c7] 7. A wide viewing angle liquid crystal display, comprising:
- a first substrate having a plurality of thin film transistors, a plurality of scanning lines and a plurality of data lines;
 - a color filter layer over the first substrate covering the thin film transistors, the scanning lines and the data lines;
 - a plurality of pixel electrodes over parts of the color filter layer;
 - a dielectric layer over the color filter layer covering the pixel electrodes;
 - a plurality of common electrode over parts of the color filter layer, wherein the common electrodes and the pixel electrodes are alternately positioned;
 - a first alignment film over the dielectric layer covering the common electrodes;
 - a second substrate formed above the first substrate;
 - a second alignment film formed above the second substrate, wherein the second alignment film faces the first alignment film; and
 - a liquid crystal layer formed between the first alignment film and the second alignment film.

- [c8] 8. The liquid crystal display of claim 7, wherein the display further includes a planarization layer over the color filter layer.
- [c9] 9. The liquid crystal display of claim 7, wherein the pixel electrodes, the common electrodes and the dielectric layer together form a plurality of pixel storage capacitors.
- [c10] 10. The liquid crystal display of claim 7, wherein the color filter layer includes a plurality of red-filter blocks, a plurality of green-filter blocks and a plurality of blue-filter blocks grouped together in a regular repetitive pattern.
- [c11] 11. The liquid crystal display of claim 10, wherein a black matrix layer is formed in the space between the red-filter blocks, the green-filter blocks and the blue-filter blocks.
- [c12] 12. The liquid crystal display of claim 7, wherein each thin film transistor includes:
a gate electrode above the first substrate, wherein the gate electrode is connected to a corresponding scanning line;
a gate insulating layer above the first substrate covering the gate electrode;

a channel layer over the gate insulating layer above the gate electrode; and
a source/drain region over the channel layer, wherein the source region is connected to a corresponding data line.

[c13] 13. The liquid crystal display of claim 12, wherein the display further includes a conductive structure in the color filter layer for electrically connecting the drain region with a corresponding pixel electrode.

[c14] 14. A method of manufacturing a wide viewing angle liquid crystal display, comprising the steps of:
providing a first substrate having a plurality of thin film transistors, a plurality of scanning lines and a plurality of data lines;
forming a color filter layer over the first substrate to cover the thin film transistors, the scanning lines and the data lines;
forming a plurality of pixel electrodes and a plurality of common electrodes over the color filter layer, wherein the pixel electrodes and the common electrodes are alternately positioned;
forming a first alignment film over the color filter to cover the pixel electrodes and the common electrodes;
providing a second substrate;
forming a second alignment film over the second sub-

strate;

forming the second substrate above the first substrate such that the second alignment film faces the first alignment film; and

injecting liquid crystal into the space between the first alignment film and the second alignment film to form a liquid crystal layer.

[c15] 15. The method of claim 14, wherein after the step of forming the color filter layer, further includes forming a planarization layer over the color filter layer.

[c16] 16. The method of claim 14, wherein the color filter layer includes a plurality of red-filter blocks, a plurality of green-filter blocks and a plurality of blue-filter blocks grouped together in a regular repetitive pattern.

[c17] 17. The method of claim 16, wherein a black matrix layer is formed in the space between the red-filter blocks, the green-filter blocks and the blue-filter blocks.

[c18] 18. The method of claim 14, wherein in the step of providing the first substrate having a plurality of thin film transistors, the thin film transistors are formed by the steps comprising:
forming a gate electrode and a plurality of scanning lines connected to the gate electrode over the first substrate;

forming a gate insulating layer over the first substrate to cover the gate electrode and the scanning lines;
forming a channel layer over the gate insulating layer above the gate; and
forming source/drain regions and the data lines to connect with the drain region.

- [c19] 19. The method of claim 18, further comprising forming a conductive structure in the color filter layer for electrically connecting the drain region with a corresponding pixel electrode.